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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,673	03/02/2002	Weng Chang	67,200-691	6397
7590 04/01/2004 TUNG & ASSOCIATES Suite 120 838 W. Long Lake Road Bloomfield Hills, MI 48302			EXAMINER TRAN, BINH X	
			ART UNIT 1765	PAPER NUMBER

DATE MAILED: 04/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary

Application No.

10/087,673

Applicant(s)

CHANG, WENG

Examiner

Binh X Tran

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

In page 11 lines 11-15 of the specification, the applicant writes, "conductive area 22b, is typically formed a first etch stop layer 24A including metal nitride or metal carbide material, for example, silicon nitride (e.g., Si_3N_4), silicon carbide (e.g., SiC), or silicon oxynitride (e.g., SiON)" (emphasis added). The examiner interprets that the applicant acts as his or her own lexicographer to specifically define that metal nitride or metal carbide includes silicon nitride, silicon carbide or silicon oxynitride. This is not acceptable because it is contrary to the ordinary meaning. It is well known in the art, that silicon is not a metal. Thus, silicon nitride or silicon oxynitride is not metal nitride; silicon carbide is not metal carbide.

This error occurs several places in the specification. For the purpose of examination, the examiner only point out one specific example in page 11. The applicant is required to correct all occurrence of this error.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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3. Claims 6, 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "silicon nitride, silicon carbide, silicon oxynitride" in claims 6, 16 is used by the claim to mean "metal nitride or metal carbide", while the accepted meaning is "semiconductor nitride or semiconductor carbide or semiconductor oxynitride." The term is indefinite because the specification does not clearly redefine the term.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-2, 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhou et al. (Us 6,358,842).

Zhou discloses a plasma etching comprising the steps of:

providing a substrate including an oxide containing insulating layer (62 and/or 70)
(See Fig 4);

providing a patterned photoresist layer (78) exposing an uppermost layer of the substrate for anisotropically plasma etching a first opening (Fig 5);

anisotropically plasma etching through a thickness of at least a portion of the substrate to form the first opening (Fig 5);

blanket depositing of a liner (82) to cover at least a portion of the sidewalls of the first opening (Fig 6, read on "etching stop liner");

patterning according to a photolithographic process (i.e. using photoresist layer 94) for etching a second opening at least partially overlying and encompassing the first opening (Fig 9);

anisotropically plasma etching through at least another portion of the thickness of the substrate including the first opening to form a second opening at least partially overlying a remaining portion of the first opening (Fig 10, col. 7 lines 40-47).

Respect to claims 2 and 12, Zhou teaches the first opening is a via opening and the second opening is a trench line opening to form a dual damascene structure (Fig 10, col. 7 lines 45-47).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3-7, 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. in view of Zhao (US 6,329,290).

Respect to claims 3 and 13, Zhou fails to disclose that the via/trench interface formed in a continuous portion of the oxide containing layer. In a dual damascene process, Zhao teach the via/trench interface formed in a continuous portion of the oxide layer (32) (Fig 11). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Zhou in view of Zhao by having the via/trench interface formed in a continuous oxide layer because it will create a high aspect ratio via.

Respect to claims 4 and 14, Zhou teaches to deposit a conformal liner to cover the sidewall of the first opening. However, Zhou fails to disclose the step of depositing the etching stop liner to conformally cover at least the sidewall and bottoms portions of the first opening. Zhao teaches to deposit a conformal etching stop liner (40) to cover the sidewall and the bottom portions of the first opening (Fig 10). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Zhou in view of Zhao by depositing a conformal liner cover the sidewall and the bottom because it will protect the underneath layer during the next etching step.

Respect to claims 5-6 and 15-16, Zhao discloses the conformal liner (40) is silicon nitride (col. 6 lines 44-45). Claims 7, 17 differ from the cited prior art by the specific thickness of the liner layer. Zhao teaches the thickness of the liner is a result effective variable and its value can be varied depending on the target width value (col. 6 lines 55-60). The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so as to produce an

expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to perform routine experiments to obtain optimal thickness for the liner as an expected result

9. Claims 8-11, 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou in view of Hussein et al. (US 6,406,995).

Respect to claims 8 and 18, Zhou fails to disclose the step of forming a plug to at least partially fill the first opening. Hussein teaches the step of filling a plug (160) to at least partially fill the first opening (Fig 6). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Zhou in view of Hussein by forming a plug to partially fill the first opening because it will protect the underneath layer during subsequent etching step.

Respect to claims 9 and 19, Hussein teaches the level of the plug vary from 200 nm to about 1200 nm including to a level equal to the depth of the second opening (See Fig 7, 12). Respect to claims 10 and 20, Hussein teaches to plug is photosensitive resin polymer (cool. 49-60). Respect to claim 11, Hussein teaches to cure the photosensitive material by exposing to UV light.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Binh X. Tran

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER

